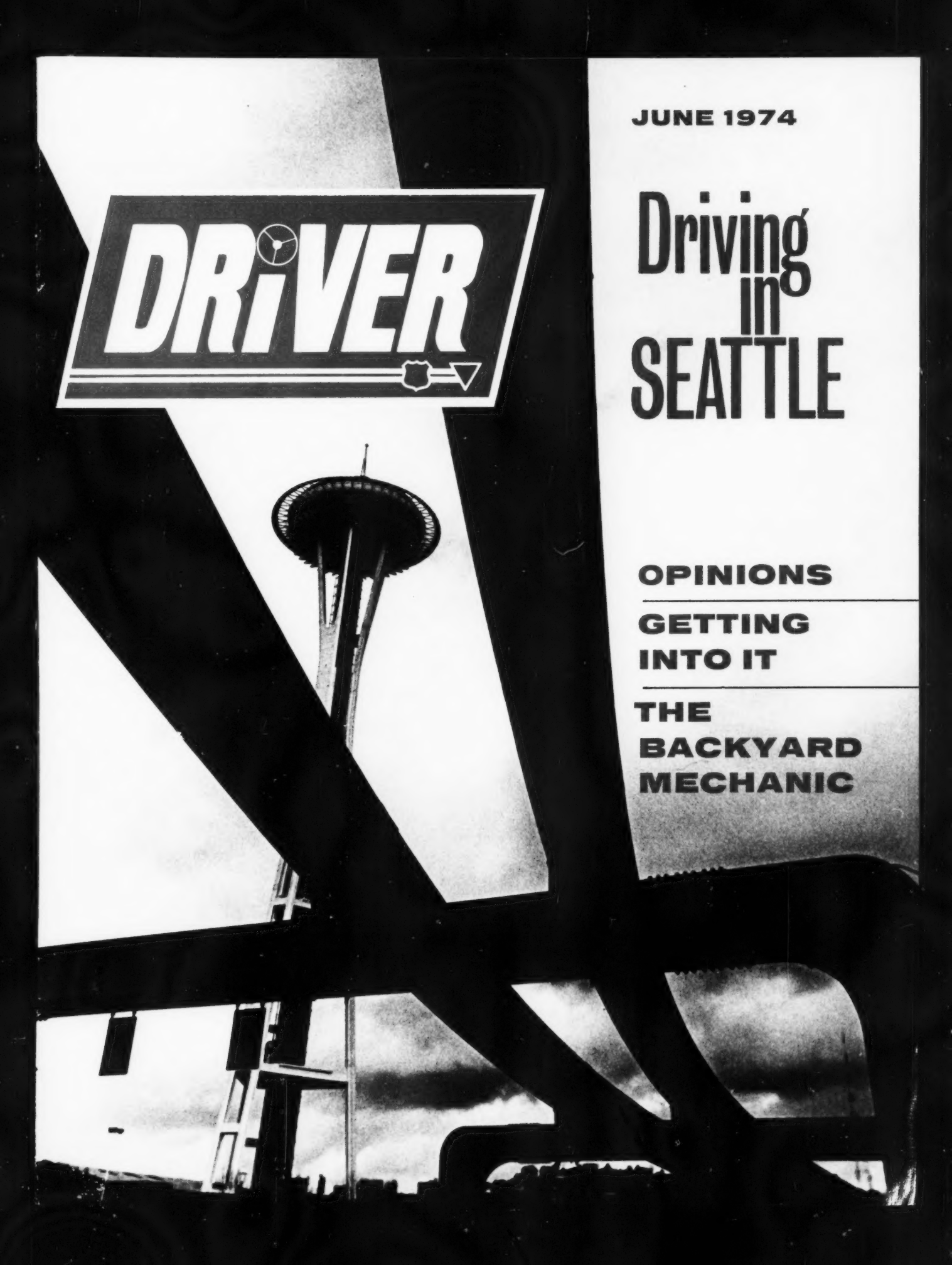

DRiVER
JUNE 1974
Driving in SEATTLE
OPINIONS
GETTING INTO IT
THE BACKYARD MECHANIC

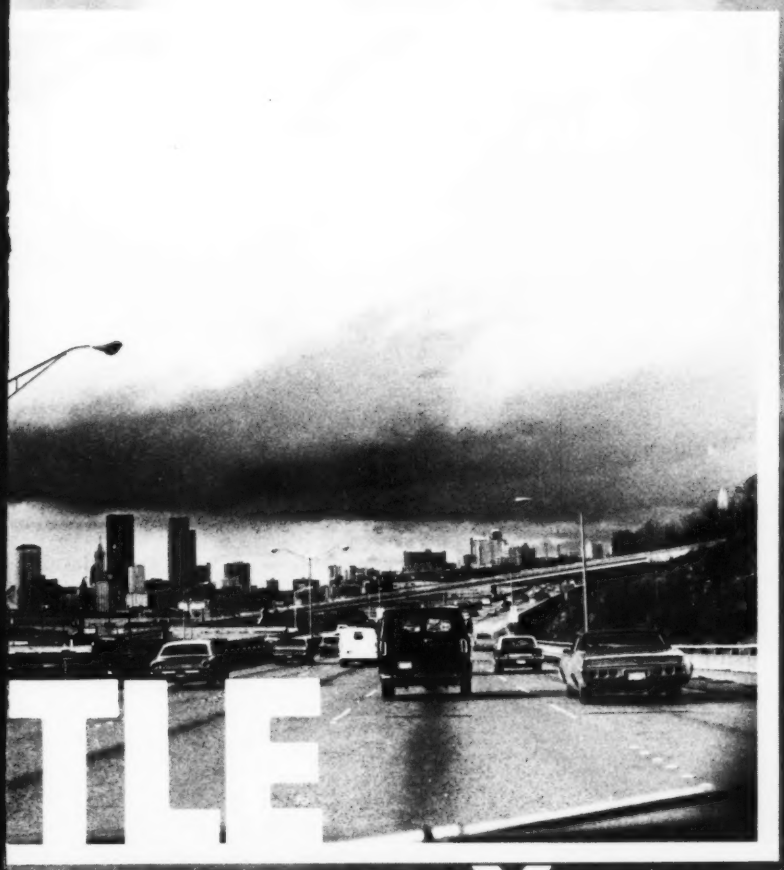
DRIVER

Seattle, largest city in the Pacific Northwest and marine gateway to Canada, Alaska, and the Orient. The freeways are excellent, and the traffic light.

DRIVING IN SEATTLE AND AROUND

A little of everything, and a lot of rain

PART 1



TLE

You've heard the song that goes, "It Never Rains in Southern California." Well, we found out why. It all heads up the coast to Seattle where it falls with great enthusiasm during the winter months. Along with all the rain come some driving problems which we learned about during our visit to Seattle, Whidbey Island Naval Air Station, the San Juan Islands, Fort Lewis, and McChord Air Force Base.

The rain's not really all that bad, and it's more than compensated for by the fantastic outdoor recreational activities found in the Pacific Northwest. All the military installations we visited have special things going for servicemen to help them take advantage of Washington's attractions cheaply and conveniently. The way we see it, you've got it made with an assignment to this area, particularly if you are turned on by boating, fishing, skiing, scuba diving, hunting, hiking, or just playing the tourist role.

Lots of service people head to Seattle during their time off, and it's no wonder. Attractions abound in this seaport city of over half-a-million, located off Interstate 5 only 50 miles north of Fort Lewis and McChord Air Force Base.

The city lies in the heart of Puget Sound, bordered by the Sound's salt water on the west, and the 24-mile-long Lake Washington on the east. Seattle curves around Elliot Bay, its large natural harbor. The mountain ranges shelter the city, the Olympics to the west and the Cascades to the east.

It's no problem to take an off-ramp on I-5 and end up right in the heart of the Northwest's largest city. You will find traffic light, except during rush hours, due to the excellent one-way and transit systems. Newcomers may have a little trouble getting the

continued

DRIVER

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

JUNE 1974

VOLUME 8 NUMBER 1

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SUBSCRIPTION—DRIVER is available on subscription for $5.25 per year domestic; $1.35 additional for foreign mailing, 50c per copy, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. Single copies will be sold and back copies will be furnished when available. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No payment can be made for manuscripts submitted for publication. Contributions are welcomed, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, AFISC/SEDD, Norton AFB CA 92409.

ATTENTION DEPT OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS, NORFOLK, VA 23511, Attn: Safety Education Dept. All other correspondence will be welcomed by the Editor.

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THE EDITOR SPEAKS

DOUBLE CLUTCH

The Department of Defense for the first time is imposing mandatory requirements—uniform throughout the services—for the use of safety belts in private cars and safety helmets and eye-protection devices on private motorcycles.

The new DOD orders apply to all on-base use of vehicles by military personnel and civilian employees and to off-base driving in the performance of official duties including PCS and TDY.

Overseas, even in areas where local laws don't require the safety devices, commanders will have the authority to prescribe their use by military personnel operating vehicles off-base.

Helmets must meet the standard established by the American National Standards Institute Z90.1 or higher.

The DOD instructions (1000.16) do not require that cyclists operate headlights while riding. However, the Air Force does have such a requirement and enforces it on base.

NEXT MONTH: "Seattle—Part II,"

Washington State Ferries, Ft. Lewis, McChord AFB.

The 600-foot Space Needle is the city's most famous landmark, and a good navigation aid to the Seattle driver. Site of the 1962 World's Fair, this area now houses a playhouse, opera house and sports coliseum. The 600-acre University of Washington is not too far away.

hang of the one-way system, but once it's mastered, getting around is a breeze. The trick is to take a good look up at the lights as you enter an intersection. The one-way arrows are usually displayed below the lights.

Some smart Navy people don't drive to Seattle, they take the ferry from Bremerton instead, and get around by bus, trolley, or on foot. Many interesting downtown areas are easily explored on foot such as the waterfront with its import shops and seafood restaurants, Pioneer Square —the only surviving bit of Gold Rush Seattle, and the main downtown shopping area.

If you do take a car, you will find that parking is not much of a problem in Seattle. Most of it is metered, and there are ample lots.

When driving downtown, watch out for the trolleys. Because they look a lot like busses, we tend to treat them as such, but we shouldn't. Trolleys are limited in their travel, and it's best not to pass them on the right, nor to sneak inside of them on corners. They swing wide on corners because of the overhead electric wires, so give them ample berth.

Seattle police told us uncontrolled intersections in Seattle are somewhat of a problem. Their advice is to be sure you always follow the rule that traffic coming from the right has the right-of-way.

Another rule that some people may not know about has to do with making a right turn after a stop at a red light. You can make the turn in Washington State providing the way is clear. If you DON'T do it, you may tie up traffic behind and let yourself in for some honking and irate comments from the natives. The same applies for a left-hand turn, providing you are turning when clear from a one-way street to a one-way street. Watch the signs.

WHERE AM I?

A particularly nice thing about driving in downtown Seattle is that you always know roughly where you are. This is because the 600-foot

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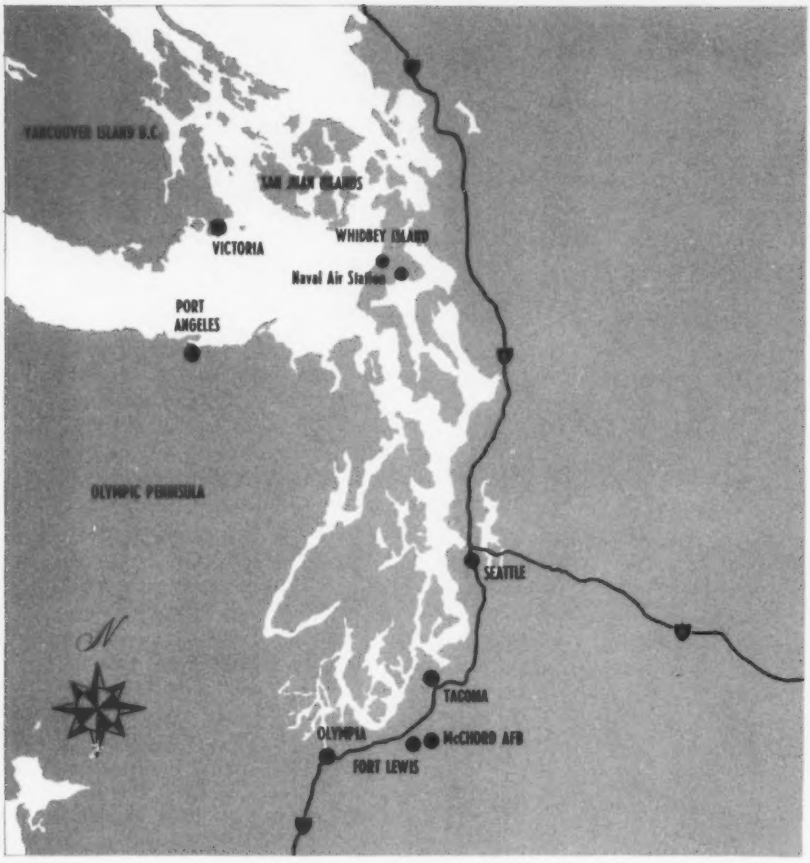


Fig. 1

Space Needle can be glimpsed from most parts of the downtown area. It serves as a landmark by which the observant driver can get his bearings.

Then there are the hills, which also help in navigation. Seattle is built on a series of hills and ridges. They are not as steep nor as numerous as those of San Francisco, but you still need to take it easy when driving because it takes longer to stop, and visibility is often nil when cresting a hill. And, as in other cities, it's the law to curb your wheels when parking.

Going north and south in Seattle is no big deal. Going east or west is a big deal. You will find this out in short order when you check out the city. Seems there was an engineering problem that resulted in the east/west routes being laid out in sort of a northeast-southwest direction. Anyway, the result is some hard-to-follow, confusing streets that often don't line up and follow a merry course around parks and intersections. The main east west route is Highway 90. Your best bet would be to use it.

WEATHER

We're not exaggerating too much about the weather. When the first rains hit is when the accidents really happen because some motorists don't slow down to allow for the increased distance needed to make a stop on the slick oil water surface. Although snow tires or chains are rarely necessary in Seattle, good tires are a must for the rainy weather. A good check for tread depth is to insert a dime in the shallowest groove (grooves should be about the same depth). If the head on the dime is covered, your tread depth is okay.

A problem related to the high humidity and rain almost universal in this part of the country is window fogging. Like, you just can't see what's happening from a couple of porthole-sized clear spots rubbed in your windows. What to do?

Good defrosters help, but they aren't the real answer because it takes a fairly long time for them to work. And they don't do much for the side windows.

What we heard recommended everywhere we went is to use one of the chemical defogging agents on the market. You can choose from several such products at most service stations and almost all of the automotive stores. The product doesn't keep the windows dry but it keeps them clear by causing the moisture to form in a solid film of perfect clearness. The chemical effect is easily renewed once a week or so by a quick wipe with a chemically-saturated cloth. By the way, Washington police cite motorists for fogged windows.

TOURISTING

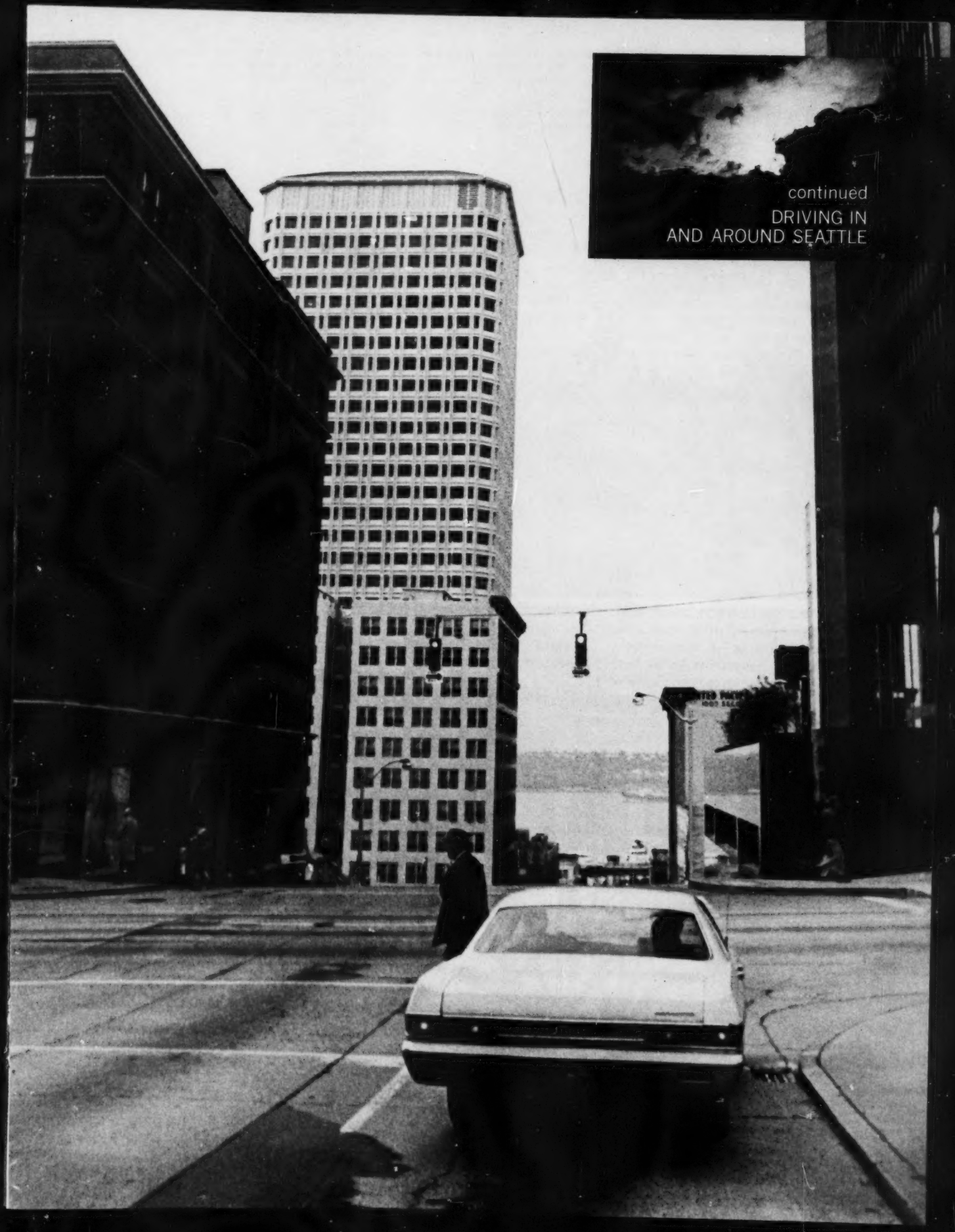
Tropical rain forest to powdery ski slopes—it's all within easy reach of Seattle. Whether you are newly assigned to this area, or merely driving through on vacation, you can't go wrong to check with the Automobile Association or Tourist Bureau regarding what to see. Pamphlets are available which map out "Circle Tours" that offer a reasonable, unrushed way to look at some of the beautiful countryside surrounding Seattle, such as the Olympic Peninsula and the ocean beaches. We took one leg of such a tour on our way north to check out Whidbey Island Naval Air Station.

WHIDBEY ISLAND NAVAL AIR STATION

"If you like the outdoors, there is no West Coast assignment equal to this one in its attractions. We have half the rainfall of Seattle, and our winter temperature is usually above 45 degrees." This is what we were told at Whidbey Island NAS, located

continued

Seattle ranges over a series of hills and ridges, some of them 500 feet high. Good brakes and tire tread are vital when driving in this city, especially when the streets are awash with heavy winter rains. One way arrows are displayed beneath traffic lights.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DRIVING IN
AND AROUND SEATTLE

Whidbey Island Naval Air Station supports the Pacific Fleet with pilots and A-6 Intruder aircraft. The installation is composed of two bases, five miles apart, and is located on the outskirts of the San Juan Islands 80 miles from Vancouver, British Columbia.

(below)

Deception Pass Bridge connects Whidbey Island with Fidelgo Island leading to Aanacortes and ferries to the San Juan Islands, and Vancouver Island, B.C.

65 miles north of Seattle on the edge of the San Juan Islands.

The Air Station is composed of two bases, five miles apart—the seaplane base, and the Naval Air Station, site of all aircraft operations. The NAS houses a medium attack wing for the Pacific Fleet with A-6 and EA-6 "Intruder" aircraft.

The base population of about 6,000 varies constantly because half the people are attached to fleet units and will deploy every six to nine months aboard an aircraft carrier for an equal period. Most of the Air Station people live in off-base military housing and in Oak Harbor only 3 miles from the base. So the average driving distance to and from work is only about 15 miles a day.

Where most of the driving comes in is during off-duty time when people head for the action on the ski slopes a few hours away, or on camping or fishing trips, or to Seattle or Vancouver, B. C. Because the base is rather isolated from larger towns, an off-duty exodus is the name of the game.

This is where some people run into a couple of problems, one of which goes by the unusual name "Black Ice."

The black ice phenomenon occurs in this part of the country even when the Fahrenheit scale is above freezing. It is a deceptively invisible layer of ice that forms on the road, and the problem is you are usually not aware of it until you find your car skidding out of control.

Black ice occurs when the movement of the air over the road surface causes the moisture on the pavement to freeze and form ice even when the ambient air is above freezing. Whidbeyites told us this occurs commonly on bridges such as the nearby Deception Pass Bridge, and also when you emerge in a clearing from a stretch of roadway protected by the woods. What compounds the invisibility problem is that at certain times of the year at Whidbey you drive to and from work in darkness.

Countermeasures for black ice include learning to recognize where it is likely to occur, and limiting speed and steering input accordingly.

Another subtle but dangerous situation results from the extensive use of vehicle heaters in this area. There are a lot of campers and other recreational vehicles in use all the time here, as well as autos. While waiting for ferries, or at other times when people occupy their cars when not underway, a common practice is to let the engine idle to keep the heater going. The advice we heard at Whidbey is "don't do it." The heater systems of idling cars in a line of immobile traffic often draw in the exhaust fumes of the car ahead, sometimes with disastrous results. In addition, it's a good idea to check your vehicle's heater system for carbon monoxide leaks. Several Whidbey motorists who have gone to the trouble have detected leaks. The base Safety Office will be glad to loan you its carbon monoxide sniffer to check out your vehicle's system.

Some guys overdo it on the mountain and city recreation bit. They over-extend themselves by staying away until the last moment, then drive back in a state of exhaustion.

We know our DRIVER readers are not the type that makes a practice of this, but should you get snowed in, or for some other reason it would be dangerous for you to return to your base, here's what to do. The base safety office recommends phoning the duty officer to explain the situation and that you won't be back until the next day. This is much better than risking your neck when the odds are against your returning home intact.

There is a lot of good boating in this area. We were told, "For eight bucks you can get a boat, motor, and gas, and be gone all day." Along with the invitation, however, goes a cautionary note. Be sure to tell somebody where you will be going and when you expect to be back, so that the proper rescue officials can be notified if you become overdue. Another thing to do before you take off is learn how the tides and currents will affect the boating in your area. The local Coast Guard has some excellent classes available that can help you become a real pro when it comes to boat handling and good seamanship.

MOTORCYCLES/BICYCLES

There's a first-class motorcycle course at Whidbey, and there has to be because there are so many riders. Sailors returning from duty with the fleet frequently bring new cycles with them inexpensively imported from the Far East. Some of these machines come disassembled so the new owner often must learn proper assembly—which is critical—as well as learning good riding techniques. If you are a Whidbey motorcyclist, you would be wise to absorb as much as possible from the motorcycle course which is taught by an experienced rider.

Whidbey is one of the prime bicycling areas in the country with beautiful scenery, lots of roads, and not too much traffic. It's best to ride off the main roads, and stay in small groups so as to allow passing room for cars. The base safety office can give you a hand in planning your route. Car drivers should pass bike riders as if they were in a car—allow plenty of room.

ON TO THE SAN JUANS

You haven't really been exposed to driving in the Seattle area until you have driven your car aboard a ferry for a leg of your trip. This is exactly what we did after leaving Whidbey Island via the spectacular Deception Pass Bridge on our circular route through Victoria, back to Tacoma, and on to Ft. Lewis and McChord. These locations will be the subject of next month's feature article.

Part III

GETTING INTO IT

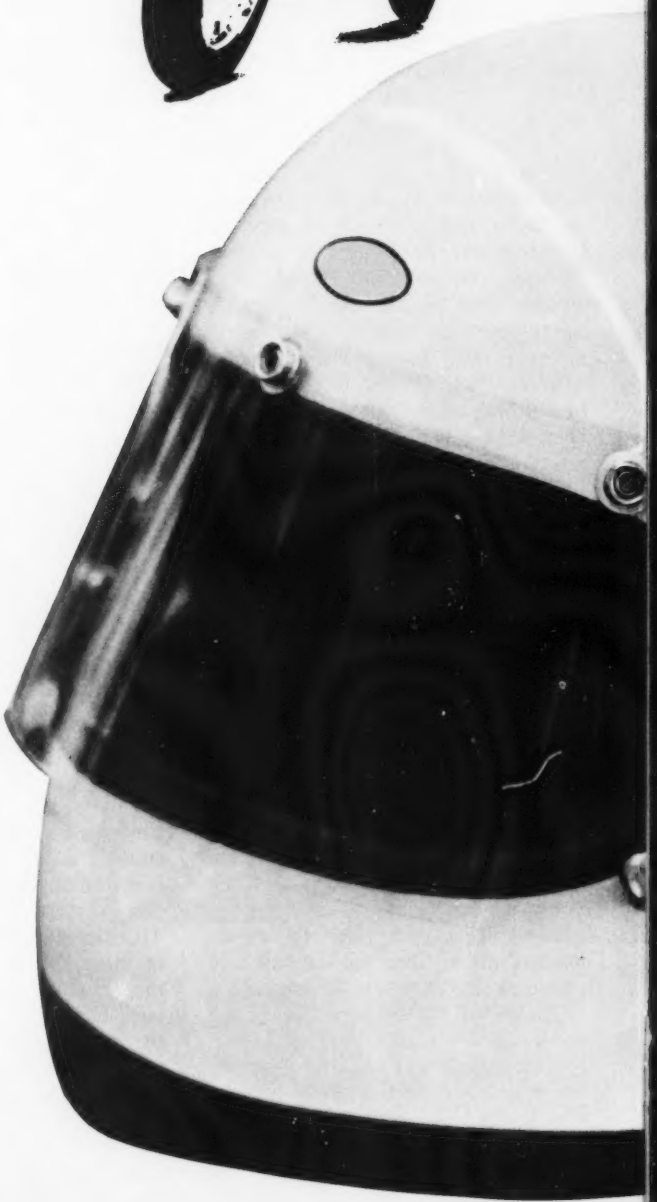
There are four basic things you should know and do before getting on a motorcycle for your first ride—and every time you get on a bike after that. The first two—knowing control locations on the machine you're riding, and making a pre-ride inspection to be sure the bike is ready to go—were covered in our previous two "Getting Into It" articles. Here we'll discuss the two other pre-ride essentials—proper riding equipment and final pre-start steps—then we'll be ready to really start riding.

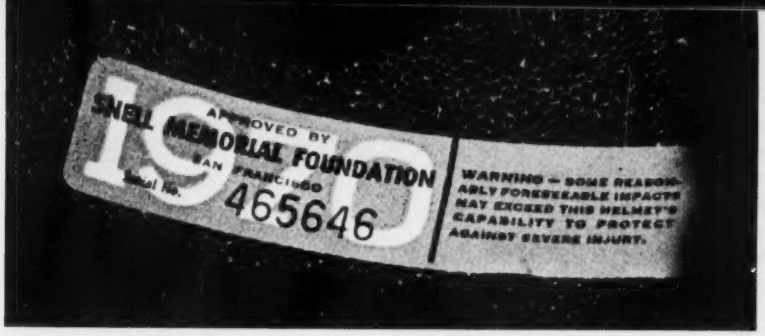
RIDING EQUIPMENT

Let's face it. You, as a motorcyclist, need all the protection you can get on the road. Any rider who doesn't realize he's pretty vulnerable doesn't really understand what motorcycling is all about. So first of all you need plenty of riding skill and experience to get you by in traffic. But nearly as important as proper riding techniques is the use of protective riding gear—just in case you get involved in one of those unfortunate situations which do happen to motorcyclists.

HELMET

The most important piece of riding equipment is an approved helmet—your helmet should be the very first thing you reach for when preparing for a ride. A helmet has obvious merits considering that your head and face are easily messed up and that most motorcycle deaths result from head injuries. But aside from crash protection, a helmet and face shield will fend off bugs and protect you from stones and other flying debris




APPROVED BY
SNELL MEMORIAL FOUNDATION
SAN FRANCISCO
Seal No. 465646
WARNING — SOME REASONABLY FORESEEABLE IMPACTS MAY EXCEED THIS HELMET'S CAPABILITY TO PROTECT AGAINST SEVERE INJURY.

Snell safety standards are more stringent than Z90. If you like your head, you'll want to be sure and put it into a helmet that is Snell certified, as well as meets Z90 standards.

Any helmet you wear should be Z90.1 certifed. To be approved in most states and on all military installations, a helmet must conform to the Z90 standard. Look inside the helmet for the Z90 certification and SHCA approval stickers to be sure the helmet meets standards.

Full-coverage helmets offer the best protection, as professional racers have known for years. For street riding, a full-coverage helmet should be the 120° visibility type.

Parts of this article adapted from *The Beginning Rider Course*.

Copyright 1974 by Motorcycle Safety Foundation.

that can be painfully dangerous nuisances on the road. This writer will never forget the first and only time he rode helmetless into a bug swarm and had to pull off the road to cough up several.

Most states have mandatory helmet laws so you don't have too much choice about wearing or not wearing a helmet when riding. But you do have a big choice as to the type of helmet you wear. What kind of helmet you use is your own thing. But be sure to get a *new* helmet (a used helmet could be internally damaged or deteriorated if polycarbonate) that carries the Z90.1 and the Safety Helmet Council of America (SHCA) approval stickers. If you're buying your first helmet, DRIVER recommends getting the best helmet you can afford —preferably a brightly-colored, full-coverage helmet (spaceman-type like the professional racers use) that meets Z90 as well as the more stringent Snell Foundation standards, and offers 120° visibility. It's also a good idea to get a helmet that's still in its original package, to insure the helmet has not been dropped or otherwise damaged.

Along with a good helmet, you should (and in most states must) have an approved shield or goggles. Shields generally work best for road use since they offer more protection from debris. If you get a tinted shield for daytime glare reduction, be sure to get a clear shield for night riding. Handle your shields carefully and keep them clean to prevent scratching that leads to light distortion—especially at night. Also, it's a good idea to

continued

treat your shields with antifogging compound (available at cycle shops) to prevent wet weather visibility problems.

OTHER GOODIES

In addition to a helmet and shield, heavy riding clothing, including boots and gloves, is recommended for all types of riding. Many people prefer special riding suits of leather or Naugahyde, but any heavy clothing provides some skin protection in a spill. If you decide to get a special riding suit, your best bet is to lay out the extra bread for leather. The reason is that in a spill leather protects your skin but also allows you to slide to a stop without tumbling. Naugahyde, on the other hand, has a tendency to tear and when it tears you start to tumble and that's when you break bones. But regardless of what you use, *always* put something substantial between you and the pavement in case of a spill. And don't neglect gloves—your hands are the most vulnerable part of your body in any type of crash.

Since being seen by other motorists is one of the biker's biggest problems, using bright or reflective riding clothes should be another important consideration. Reflectorized vests, available at many cycle shops, help in this category. Along with making you more visible, the use of bright attractive riding clothing helps present a better image of the biker. This makes riding safer for all of us by helping to improve drivers' attitudes toward motorcyclists.

PRE-RIDE

As we emphasized in our first installment, we hope that if you're just getting into motorcycling you have attended or are attending a riding school. At the very least, you should be learning from an experienced rider in a vacant field or parking lot. So we won't spend too much time on the very basics of starting a bike and elementary riding procedures. However, we are including outlines of basic steps to serve as guides and reminders to you new "shoes."

PRE-START

When preparing to ride you should, of course, make a bike-condition check. But also make a final pre-start check after suiting up. These steps should include:

Checking for obvious defects (loose nuts, broken spokes, flat tires).

Turning on the ignition switch.

Turning on the fuel supply valve.

Checking all lights including the brake light and turn signals.

Making doubly sure brakes operate.

Anti-fogging agents are available at most cycle shops and keep face shields from clouding in rainy or humid weather.

Special riding suits or heavy clothing are a must between you and the pavement when riding. Your hands are very vulnerable in a spill—don't forget gloves.

High-visibility vests or jackets are great for making you more visible on the road. These garments are available at most good cycle shops.

If the engine is cold, flip on the choke.

Before taking off you should have the feel of the motorcycle beneath you. The best way to do this is to walk the bike (engine off) or have a buddy push the bike with you in the riding position. While he pushes, make a final check to be sure you have a feel of the machine and all controls. If you feel confident about the bike you're ready for a ride under the supervision of your instructor.

STARTING

The first step is obviously starting the bike. Starting procedures vary from model to model. But there are general rules to remember. *First,* make sure that the gear shift lever is in *neutral.* Many motorcycles have a neutral indicator which lights up (green) when the ignition is on and the gear shift is in neutral. However, you may have to roll the motorcycle to be sure the bike is out of gear.

Second, make sure the fuel supply valve (petcock) is in the ON position —straight up and down. The fuel supply valve is usually found on the bottom of the gas tank on the left or right side. *Third,* turn the key to the ON position, and if the engine is cold, turn on the choke.

STARTING CHECKLIST

- Turn on fuel valve.
- Shift to neutral—check by rolling bike.
- Make sure the "kill switch" (if bike is so equipped) is in the ON position.
- Turn choke on if the engine is cold.
- Open throttle slightly.
- Lean cycle away from kick-starter side. This will offset the force of your kick when starting.
- Place your foot on the kick starter with the lever pedal slightly behind the ball of your foot.
- Kick the start lever down with a quick, smooth motion and hold the lever at the bottom of its stroke.
- *Never let the lever snap back by itself.*
- Repeat if necessary to start the engine.
- When the engine starts, close the throttle. Do not allow the engine to race. Return the kick starter lever to its original position.
- Leave the choke ON while engine is warming up. Turn off before riding.
- Turn on headlight for riding. You should always ride with the headlight glowing to make you more visible to other motorists.

CLUTCH

The trick to starting a cycle in motion is to use the clutch and throttle properly and smoothly. The key to a smooth start is the friction point.

After starting the engine you have to get the feel of the clutch.

The point at which the cycle starts to move when you let the clutch out is called the FRICTION POINT. It is the point at which the clutch connects the engine power with the rear wheel.

When you ease out on the clutch lever and feel the engine slowing down, you are at the friction point. When this happens, hold the clutch lever at this point and accelerate gradually with the throttle. After the cycle starts to move, release the clutch.

If the cycle jerks or jumps forward, squeeze the clutch, release the throttle and start over.

You will have to practice this clutch-friction-point throttle routine several times before you get the real "feel" for it.

CLUTCH CHECKLIST

- Mount the motorcycle.
- Start the engine (use the proper procedure).
- Squeeze the clutch lever and shift into first gear.
- Begin *walking* the motorcycle.
- Release the clutch slowly and start applying the throttle by rolling it toward you.
- When you feel the engine taking hold (FRICTION POINT), release the clutch gradually as you accelerate gently. Lift your feet and place them on the pegs.
- Sit comfortably in the saddle and steer.

BRAKE

The next logical step after you get rolling is stopping. At first you will need to use only the rear brake—you should have already practiced braking so it shouldn't be any sweat. There are a couple of points to remember, however.

BRAKE CHECKLIST

- When you're ready to stop, start taking action before you get to your stop point—just as with a car.
- Roll off the throttle.
- Squeeze the clutch lever.
- Apply brake gradually so you stop smoothly.
- Shift to NEUTRAL. Release the clutch slowly to make sure the motorcycle does not jump forward.

To prevent stalling at low speeds (under 10 mph) the clutch must be

continued

disengaged before the rear brake is applied. At higher speeds the brake is applied before the clutch lever is pulled in.

TURNING

When you get the feel of the bike and can clutch and stop, practice turning at slow speeds. If you're not in a riding course, set up your own practice course that includes weaving, riding a figure 8, and riding in circles. One of the best exercises is to begin riding in a large circle and continue turning smaller, tighter circles—this gives you a feel for gradual turns as well as tighter turns that require leaning the bike further. A few basics apply for slow-speed turns.

TURNING CHECKLIST

- Slow down before beginning to turn.
- Lean your body in the direction you are turning.
- Turn handlebars toward the direction of the turn.
- Keep your right foot covering the rear brake pedal in anticipation of slowdowns or stops.
- Do not remove your feet from the foot pegs when making a turn.

SHIFTING

- Shifting is the next step in developing a real feel for your machine. Providing you've practiced with the clutch you shouldn't have any trouble changing gears. Gear changes are important to keep a motorcycle operating in the right power range. Unlike a manual transmission car, you do a lot of shifting—both up and down—on a bike. Most motorcycles have 4, 5, 6, or even more gears that must be used to keep the bike operating in the right power band. Learn the shift pattern for your bike (it varies) and practice shifting up and down until you know what gears are needed for various speed and riding conditions. These basics apply for shifting.

UPSHIFTING

- Disengage the clutch and roll back the throttle at the same time.

After getting the basic feel of the bike, a new rider should practice clutching, shifting, and especially braking until these operations come almost automatically.

A riding school is the best place to get a good feel of your bike and develop the basic riding skills. If you can't attend a school, you should set up your own courses to practice cornering and braking at various speeds.

■ With your toe, raise (or lower on some bikes) the gearshift lever through its full arc.

■ Remove your foot and allow the lever to return to the neutral position.

■ Engage clutch gradually.

■ Open the throttle slowly.

DOWNSHIFTING

The procedure for changing from a higher to a lower gear is the reverse of that used for upshifting. To reduce the shock that occurs with the quick reduction in speed while downshifting, decrease your engine speed before engaging the clutch.

■ Disengage the clutch.

■ Push down on the gearshift lever as far as possible.

■ Release the gearshift lever quickly.

■ Decrease your throttle speed.

■ Reengage the clutch slowly.

■ Open the throttle gently.

Common downshifting situations include:

■ Before going down or up a hill.

■ When the engine is lugging.

■ Before stopping. On a bike you should downshift through the gears and use brakes sparingly when slowing or stopping.

■ Before a turn or any time you need to slow down such as when approaching an intersection.

The most important maneuvers for the new rider are learning to turn and corner at higher speeds, and utilizing both brakes properly. The following tips coupled with plenty of practice should have you ready for our next installment when we'll offer tips on riding in traffic and other riding conditions.

TURNING AT HIGHER SPEEDS

Turning a motorcycle at higher speeds is different than turning at slower speeds. At high speeds, your motorcycle and your body must lean at the same angle. Your body must be in the same line or angle as that of the cycle.

In higher speed turns, the motorcycle will have a natural tendency to follow the arc of the turn. There are two mistakes which could affect your turn:

■ You may not be leaning enough. This could cause you to run off the road on the outside of the curve. To correct this, you must lean your body and cycle over farther or reduce your speed.

■ The other possible mistake is overleaning. If you should lean too much you can run off the road on the inside of the curve. To correct this condition, straighten up so that your lean is correct or increase your speed to handle the angle you are leaning.

Along with the previously mentioned cornering suggestions, these tips apply for higher speed turns.

■ Always enter curves and corners at a safe speed. Slow down *before* entering.

■ Begin to accelerate as you proceed through the curve or corner.

■ Accelerate as you leave the corner or curve.

■ *Do not* brake in turns except in an emergency. Doing so may lock your wheels and cause a loss of control.

■ If you must brake in a corner, straighten up as much as possible so the bike is not leaned when the brake is applied.

■ Always keep your feet on the footpegs.

BRAKING WITH FRONT AND REAR WHEEL

Your rear wheel brake has only limited stopping ability. When it becomes necessary to stop more quickly, you must use the front brake in combination with the rear brake. Almost 70 per cent of a motorcycle's stopping power is in the front brake. Therefore, a sequence of combination braking is essential.

To stop with both brakes you must:

■ Roll off the throttle.

■ Apply the rear brake.

■ When the rear brake starts to take hold, apply the front brake by squeezing the hand lever. Do not turn the throttle.

■ Downshift as needed.

■ Squeeze the clutch lever to disengage it when your speed is reduced below 10 mph.

For most stops, you should use the front and rear brakes in combination with one another. Whenever you brake, the weight on the cycle shifts forward. This shift in weight places extra weight on the front wheel, helping it to grip the road for braking. As a result, the front brake has more stopping power than the rear brake.

It's essential that you practice combination braking until you are completely confident using the front brake. Being afraid of the front brake is a mistake that gets some riders in trouble in a tight situation. Be sure to keep the front brake properly adjusted and practice some all-out panic stops with the front brake full-on so you know what will happen when you have to do it on the road.

■ There are three basic situations in which you should use the front brake extra cautiously:

■ When the roadway is slippery. (If the surface is wet from water or loose from sand, gravel or mud, you might slide.)

■ When the front wheel is turned.

■ When you are leaning the motorcycle in a turn.

THE GOVERNMENT AND

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Some observations from Dr. James about the federal government's inf

Dr. JAMES B. GREGORY

"People accept seat belts better on airplanes than in cars because the teacher is right there watching them!"

"Americans really hate to spend money for something additional that looks like it's going to make them less comfortable in their driving, just to save them from something that hasn't happened to them yet and that they think isn't ever going to happen."

There's an agency in Washington, D.C. that influences everybody who drives or rides in a car, yet very few of us can call it by name. It's the National Highway Traffic Safety Administration, a part of the U.S. Department of Transportation. In the past seven or eight years, the NHTSA has had an effect upon almost every part of our automobiles, from the way our windshield wipers work to our transmission gear selection.

No doubt the NHTSA's most famous impact on our cars has been the safety belt, particularly the belt-ignition interlock system on the '74 models. We drivers have learned to take for granted many of the standards the agency established in its earlier days, such as collapsible steering wheels and padded dashes.

The federal government's active participation in the safety of motor vehicles began in 1966, when Congress enacted a law directing the Secretary of Transportation to issue Federal motor vehicle safety standards to which auto manufacturers thereafter would conform.

Before issuing a new rule, or standard, NHTSA publishes advance notices of its intentions. Interested people may then present arguments against the proposed rule. Needless to say, automobile manufacturers sometimes have vigorous objections to a new standard. Such was the case when the agency announced its plan to require the air bag for 1976 model cars. Chrysler and other auto makers

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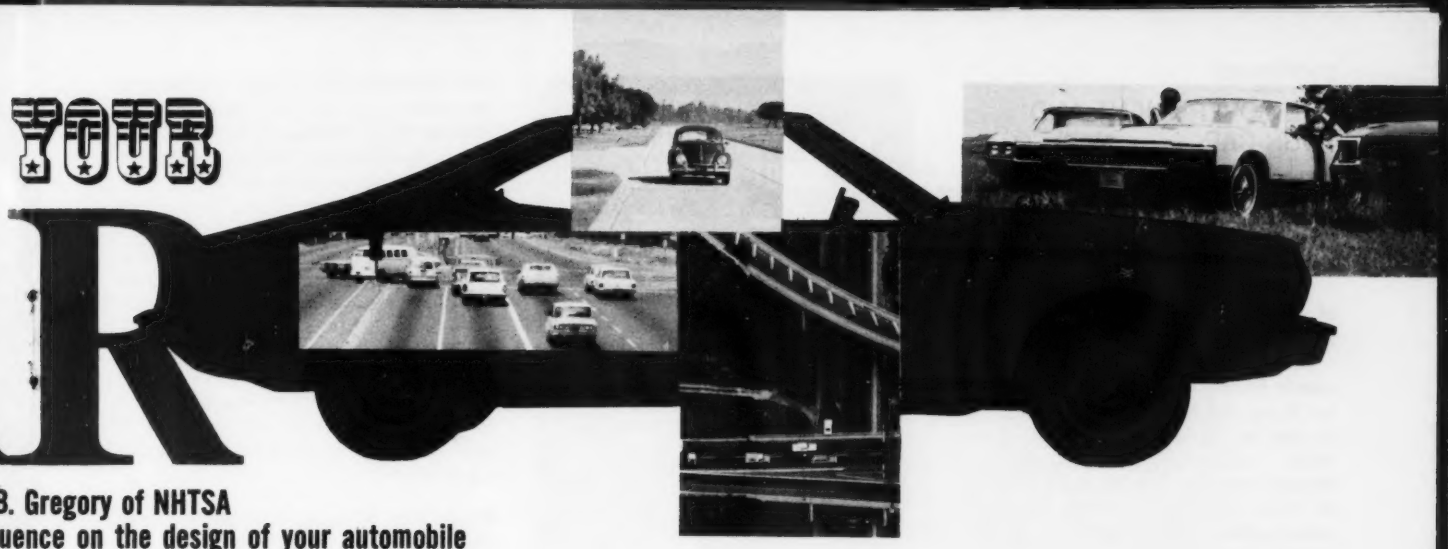

mes B. Gregory of NHTSA
s influence on the design of your automobile

asked a federal appeals court to declare the requirement faulty. The court did just that on the basis that, although the standard was fundamentally valid, the agency hadn't developed an adequate dummy for testing the systems. The agency has since developed a new dummy and has just proposed reinstating its requirement for inflatable air bags or other "passive restraint" systems, effective with 1977 models, but with somewhat less rigorous requirements than in the earlier proposal. The auto manufacturers have not yet commented publicly.

NHTSA has had a new Administrator since August of last year. Dr. James B. Gregory came to this government post from the oil industry, where he had 20 years experience in industrial research and technical administration. A chemist, he knows a thing or three about automobiles and in fact has designed and patented fuel systems.

DRIVER felt that Dr. Gregory would have some interesting things to tell you readers about what was going on at the agency that would affect you and your car over the next few years. We were pleased when he promptly granted our request for this interview.

DRIVER: *Dr. Gregory, what are the top priorities of the National Highway Traffic Safety Administration?*

Dr. Gregory: Doing those things that will impact the "bottom line" soonest and most effectively. And by "bottom line" I mean the number of accidents, the number of fatalities, the number of injuries and the severity of those injuries. These provide an index of how well we are doing. Our priorities are those things that are sensible, mean the most, aren't too expensive and inconvenient, and that we hope people will respond to. You have to put some kind of measure on things. If you ask people to do a specific thing, they are entitled to ask what they are going to get out of it.

Around here we talk about a balanced program—we have the physical sciences and we have the social sciences. The physical sciences ask what can be done to make the automobile safer in order to avoid an accident and how to protect the occupants if an accident cannot be avoided. These physical things are "defensive."

The tough job is in the social sciences, where we are dealing with people, their attitudes and their driving competency.

DRIVER: *Statistics show that the highway death toll and the number of highway accidents have decreased significantly since the 55 mph speed limit went into effect. Would you comment?*

Dr. Gregory: Coming from the oil industry as I did, I knew in August that there would be an energy shortage that people would really have to get involved with. We watched with interest as the states began reducing speed limits in November. About a dozen states reduced their speed limits to 55 or 50 and experienced a 15 to 20% drop in fatalities, while the other states achieved a modest 2% drop, probably reflecting a slight decrease in driving.

In December there was a drop of about 20% or more in the 55 mph states and a 10 to 12% decrease in others, showing the broader edge of the energy shortage. In January the figure was 23%.

Now, nobody likes gas shortages and we're certainly not insisting on today's constraints. But what we have learned is that when everybody does something different, whether it's changing their driving habits or lowering their speeds or carpooling or whatever, that "bottom line" of accident experience can be affected. The 23% drop in January represents 850 or 900 people fewer dying in January '74 than died in January '73.

I suppose people are expecting me to say, "Nobody should drive over 45 mph ever again." Well, that's not what I'm saying. We have to think about mobility and the proper use of our highways.

But that 50,000-deaths-a-year figure we've been experiencing is *not* something handed down from Olympus. We *can* do something about it.

DRIVER: *What significant developments have derived from the Experimental Safety Vehicle Program?*

Dr. Gregory: The ESV program gave people a lot of latitude and what we got were a lot of very heavy cars intended to absorb energy in a crash. Foreign car makers came up with some interesting ideas in the ESV program and in fact some things—such as the display

continued

of the car's operating condition—are showing up on their production models.

Now we are in a new phase—Research Safety Vehicles. We said, "Let's see if we can build a 3,000-pound car, or less, in accordance with the present trend, incorporating the things we learned from the ESV. Not just in terms of safety, but also in terms of energy conservation, environmental quality and economy of ownership."

First there will be a design phase on paper. You know, the laws of physics say that under identical conditions and with the same kind of restraints, the guy in the small car will come off second best to the guy in the big car. We have to say, O.K., but we know small cars can be made a heck of a lot safer.

DRIVER: *What about the air bag program?*

Dr. Gregory: The main thrust in occupant protection now is the passive restraint, and the agency has just proposed reinstating our earlier requirement that auto makers install automatically inflating air bags or other passive restraint systems in cars effective with 1977 models. We have gone out for responses from all interested parties regarding this proposal.

The passive restraint rule would mean that auto producers would equip vehicles with systems that protect occupants without any "active" moves on their part, such as buckling belts. Our proposed rule would require passive protection for front-seat occupants only, in frontal, angular and side collisions. If the car gives the same protection in rollovers, a front-seat belt system wouldn't be required. If the car does not meet the rollover requirements, then a sequential belt system also would be required. And of course, belts still would be mandatory for rear seats.

DRIVER: *Does the emphasis on passive restraints mean that you will no longer encourage the states to legislate seat-belt-use laws?*

Dr. Gregory: No, we're not backing off at all. There will still be 80 or 100 million cars on the road with belts and some of them will be out there for another 10 years. Congress is encouraging the states to pass such legislation by offering them additional funds if they do so. Incidentally, we have asked for comments on a new belt option for 1975 to 1979 cars whereby the driver can start the car but can't put it into forward gear unless his belt is fastened. I would anticipate favorable response, but of course we can't be sure.

DRIVER: *We think you'll agree that attitudes and motivations have a lot to do with how safely and responsibly a person drives. Why is no attempt made at psychological screening prior to licensing a driver?*

Dr. Gregory: Well, psychological screening of driver's license applicants has often been suggested. But you know, despite laws defining driving as a privilege, people really do consider it a right. To undertake such screening, you would have to convince people that the tests you are providing really *do* sort out the bad drivers.

On the order of about 85% of all crashes are caused by driver error. So you can see why I always say that whatever we do in the physical sciences to improve the car are only "defensive" things. The big job is in the social sciences, where we have to change attitudes, improve technical competency, improve training. This is hard because you have to get people to DO something. Maybe it's not so hard when you start them out that way—from the time they first learn to drive—but how do you change people's habits and attitudes once they are established?

This is a tough area and it includes this alcohol business. It's no news to anybody that over 50% of the fatalities on the road are alcohol-involved. How do you get people to the point where they will say, "Look, I really don't think I'm competent after this many drinks to drive"?

People who wouldn't even clean a gun after drinking will drive a car. Part of it is social acceptability. And conditioning—how our heads were screwed on as we were growing up.

DRIVER: *We frequently get questions about new designs in headlights. Do you have any comments?*

Dr. Gregory: I think it's possible that increased beam intensity can do something for us, but we are not far enough along in our data to make any rules. We have to be sure that if we change things, we change them for the better. What we have done lately is put out a notice on the utilization of rectangular headlamps.

WHAT THEY'RE THINKING ABOUT AT NHTSA

(Some of these items are already in standards, some are in study or data-collection)

- Mandatory passive restraint systems, such as air cushions, for the front seats of all 1977 passenger cars.
- Rear lighting systems to signal vehicle acceleration or braking by lamp color and provide a pulsating signal to indicate rapid deceleration.
- Improved fuel tanks to lessen the dangers of fuel spillage and explosion in crashes.
- Stiffer standards for child restraints.
- Periodic motor vehicle inspections in every state.
- The possibility of improving headlamps.
- Uniform tire grading standards and requirement that tires be labeled in accordance with these standards.
- A passive belt system for 1975 cars, with single diagonal belt anchored to the rear edge of the door, positioning itself when door is closed and slack taken up by retractor (including an energy-absorbing knee bolster).
- Higher-speed protection requirements in the 45 to 50 mph range instead of 30 mph (into a fixed barrier).
- A Research Safety Vehicle weighing under 3,000 pounds.

"Young People are over-involved in traffic accidents. They themselves should examine the thrust of safety programs and see how they can become involved."

Whatever we do, I want the data to back it up. I don't want to proliferate all sorts of headlamps if they aren't really necessary. Back in the '30s, everybody had their own size and shape. The Society of Automotive Engineers finally said, "Hey, we've got to standardize; things are out of hand."

DRIVER: *What are the Agency's views about periodic motor vehicle inspections?*

Dr. Gregory: The subject of periodic motor vehicle inspections has always been a rather controversial one. The question has been, does it really reduce the number of crashes or the severity? In trying to be objective and analyze these things, we've found that 80 or 90% of the maintenance problems are in brakes, suspension, steering and tires. And the studies we've carried out indicate that somewhere between 6 and 17% either are direct cause or contributory to the accidents that happen.

I think this is significant. If you rounded off to 10%, or even 6%, of the fatalities, that would mean on the order of 1500 or 2000 people a year who are killed because of the direct contribution of bad maintenance. We haven't pinned this down *per se*, but at least it's big enough that we're beginning to measure it.

And many of the states do, of course, have periodic motor vehicle inspection programs. As a matter of fact, within our Highway Safety Program, that's one of the requirements. In order for the states to take advantage of Program funds, they must have an inspection program in their plans and be diligent about working on it—obviously legislation has to be passed by the states to institute the program and this takes time.

DRIVER: *What about child restraint systems? Would you say that some parents are unaware of the dangers of some restraints which supposedly protect their child?*

Dr. Gregory: Well, I would hope not. Just since I have been here we have put out I don't know how many cautionary public advisories about specific restraints. And we recently published a whole new look at child restraint systems. Not only car seats but also infant carriers. There are actually dynamic tests now and we have an upgraded standard. We are concerned that people aren't buying a sufficient number of child restraints, and we are encouraging them to provide this equipment. It's a nuisance, but good designs can really save childrens' lives.

ABOUT MISS DRIVER

(See back cover)

Our June message is from Lois Jones, who spends her free time waterskiing, jogging, bicycling, and playing guitar. She attended Delta Junior College in Stockton, CA, and now works as a secretary. A real outdoor girl, Lois wants more than anything to live at the seashore.

CRASH FIRES INFREQUENT

Some people won't use safety belts because they fear being trapped in a burning car. New studies now show that automobile fire is a rare occurrence. Calspan (The Automobile Crash Injury Research Program at Cornell Aeronautical Laboratory) has been collecting in-depth data on injury-producing accidents since the 1950s. It estimates that less than one-half of one percent involve fire of any kind. The Highway Safety Research Institute of the University of Michigan estimates a maximum of 650 U.S. fatalities may occur annually in accidents resulting in post-crash fires. This is in sharp contrast to the 40,000 or more traffic victims who died because they were thrown from the vehicle, impacted the windshield, were crushed against the steering wheel, or were bounced about the interior of the vehicle like a ping-pong ball.

SMSgt JAMES R. BUCKWALTER, USAF
Home: Lincoln, Nebraska

AMN CHERYL KILLMARTIN, USAF
Home: Santa Susana, California

TM2 LINDSEY S. FULWOOD, USN
Home: Supply, North Carolina

DRIVER likes to know what you people are thinking about cars and cycles and allied subjects. So whenever we get the chance we go out and ask questions. Sometimes the answers we get surprise us. But one thing's for sure—almost everybody has an opinion on just about everything. Here are some questions we've been asking lately. How do these answers compare with your personal opinions?

OPINIONS

HERE ARE THE QUESTIONS

What do you think about the 55 miles per hour highway speed limit?

Having just come back from Japan, it's new to me. I haven't been able to creep into it like everybody else has. But it doesn't bother me at all. It gives me a little better chance than I had before.

Well, it doesn't bother me because I'm not a fast driver. But I know it's difficult for people who've got big engines in their cars. They've no way to burn the carbon out of their engines, driving at slower speeds.

Actually, I'm stationed in Hawaii and it doesn't really affect me. We have only one freeway over there and the average speed limit is 50 miles an hour, and it has been in the three years I've been there. I'm on my way home on leave now, and driving 55 back there will call for a little adjustment on my part. I have a pretty hot car, and I'd much rather drive a little faster than 55 at times. Conserving energy is the reason for all of this, so whatever it takes to keep the country running is what we've got to go along with.

Are you aware that the highway death toll has dropped significantly since it went into effect?

Yes, I am. It's made a big impression on me. I, like a lot of people, was under the impression that speed didn't kill. I think that the 55 mile limit is the greatest thing that ever happened in this country.

Yes, I've heard that on the news. I think the lower speed limit has a lot to do with it, but I don't have any paper work or proof to say that this is the reason. But, personally, I think it has something to do with it.

Yes, I've heard reports of this—TV, newspapers, radio—mostly coming from the mainland. But there are quite a few accidents in Hawaii, too—a lot more than I think there should be. But I feel that even if we had as many accidents at 50 or 55 as we would at say 75, they wouldn't take as many lives and there'd be a lot less damage. So overall, I think that 55 miles an hour does conserve energy and conserves lives.

When you drive, do you ever think about the possibility or consequences of an accident?

Mainly, I don't think as much about the liability I have towards other people as I think of what they can do to *me*. I personally feel I'm a pretty good driver, but I can't control the other driver. That's the guy I have to look out for. Sure, I think about the consequences of an accident, but not constantly.

I always think about that, because you can be a perfect driver, but someone can pull out from somewhere, and that's it. There's always the possibility of an accident. Personally, I'm a defensive driver. I do worry about children in a car—like if they don't have seat belts or something like that. I know the parents are responsible for them, but the poor kids . . . they really don't know what's going on.

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Always. I've never been in an accident—nothing more than just a light bump from behind. I'm one of the lucky ones. I've been driving a long time, and I've never been hurt. But I'm always conscious of the other guys out there—the guys that do drive carelessly and don't watch out for the other drivers. I always think about myself. I know that I could, as well as anyone else, be the one who's carried away in the ambulance. I've just been lucky, so far.

What do you think about safety belts? Do you wear them?

SMSgt BUCKWALTER

I think seat belts are good. I've never been in an accident where seat belts were to my advantage or disadvantage. I hope I never am. Personally, I know of one guy I was stationed with . . . He was driving his personal car at night, and he went off the road. It was a single-car accident. He was able to walk away from it. Well, seat belts saved his life.

AMN KILLMARTIN

My husband and I were once in an accident. At that time, we didn't have seat belts, and I ended up with whiplash. Now that we do have seat belts, we always use them. One thing I don't like, though, is that buzzer system. I hate to hear that buzzer!

TM2 FULWOOD

Seat belts are good. On the mainland I used to wear them, particularly around Norfolk, Virginia. But I don't wear them in Hawaii. Back home, it was more of a trend there. It seemed that everyone wore seat belts. I guess I kind of followed the trend. But for the last three years I haven't bothered to wear them. When I get home, I'll probably wear them. My wife is a firm believer in seat belts. She doesn't like for me to drive at all without using them.

What comments do you have about the push to require more safely constructed cars?

As I said, I just returned from Japan where the construction of automobiles isn't as good as it is here. I've seen what can happen to a small, poorly-constructed car, in that country. I think it's good that we have heavier, more safely-constructed cars, here.

I'm definitely for stronger built cars. It was getting so that some times the whole fender would fall off the car, or something like that. Terrible! But as I said before, I hate the buzzer system in the '74s. I'm really against those buzzers. I'd wear my seat belt, regardless.

I think that should be our number one concern. Right now, I guess luxury and good looks are a big thing with our cars—a lot of looks and a lot of luxury, but not enough safety. I think safety should be our number one concern in building automobiles. I don't blame the lack of it on the automobile companies as much as I blame it on the consumers, the people who are buying them. If they didn't buy unsafe cars, they'd have to stop making unsafe cars. So unless we start thinking in terms of safety and forget some of the comfort and luxury, then we're going to continue to drive unsafe cars.

What bugs you most about other drivers?

Well, when you're riding with a person who converses with his passengers and keeps turning his head where he's not keeping his eyes on the road. Otherwise, inconsistency bothers me. Like persons trying to make a right turn from the left lane and vice versa. The unexpected, really. If I can count on what I think he's going to do—if I can anticipate his actions—then I feel a lot better. But inconsistency is what bugs me the most.

Tailgating . . . someone breathing down your neck. And people who don't use signals. A lot of people don't use signals and they cut right in front of you. That not only bugs me, but it scares me.

I've been bugged more with drivers in Hawaii than anyplace else. Everyone is out for himself. There's very seldom a time that you see signals—hand signals, light signals, turn signals, or whatever. When someone wants to move over in front of you, they usually do it without any signal at all to let you know what they're going to do. That really bugs me.

OPINIONS
continued

Insurance companies charge higher rates for younger drivers in the high-risk age group. What comments do you have on this?

Well, the insurance companies deal with statistics, and statistics show that the younger driver is the one that's most involved in accidents. I think there should be some plan for the young driver who's a good driver. I personally feel that, as I get older, I'm slowing down. I'm slowing down on my reactions, and I feel I'm not as good a driver as I was when I was younger. There should be some compensation for the good, young driver.

I don't feel they should be higher. Like myself, I'm not a speeder and I don't like to race, or anything like that. In general, I guess it's fair, but I think they should figure on how many accidents and tickets someone has, in order to set the rates. I don't see why they can't bring the rates down, if you have a good driving record.

I don't think it should be determined solely on one's age. There are both good and bad drivers, young and old, and I think driving records should determine what your insurance is going to cost you. I guess insurance companies are trying to protect themselves. But after a couple of years of driving without accidents, even under the age of 25, and whether or not you're married, your record should speak for itself. I think that would be a much better way of being fair with a person. That way a person doesn't have to pay for the guy who's having 10 accidents a year, if he isn't having any.

Other comments?

In my job as a field supervisor for the 44th Strategic Missile Wing, I spend a lot of time behind the wheel. This week, I've driven over 500 miles in three days, and that's quite a bit of road time. A couple of years back, because of a driving mistake in my private car, I had to take a remedial course in drivers' training. I learned some things that I wish everybody knew. Like, there are three areas in defensive driving. They're represented by the letters S-E-E. "S" stands for *scan*. Scan everything you can—rear-view mirror, front, back, and side. Try to see everything that's going on, on the road. The next thing is to *evaluate*. Once you've scanned, then evaluate each situation that comes to you, whether it's an automobile pulling out from the right, a fast-moving car coming up from the left, or somebody coming head-on with bright lights. Evaluate the situation and figure where your problem is. The other thing is to *eyeball*. Eyeball the other driver. Look at him. Make sure that you see him and that he sees you. Then, your chances of an accident are a lot less.

I think men and women have different attitudes toward driving. I do feel that most women drivers are crazy. I'm not saying all of them are, but a heck of a lot of them are. Men don't lose their heads as quickly as women do. We don't think quick enough. It's easier for us to lose our cool, especially in an emergency situation. Like with my husband—I know I'd lose my head a lot more quickly than he would.

We'll be driving for the rest of our lives—so we'll never get away from it. If everybody would just think about the other guy and how the other guy should think about him on the highway, I don't think we'd have as many accidents. Consideration is of prime importance, along with the safety of others. In my book, I feel that's the real biggy. We'll always have some of the flaky types on the road, but maybe the conscientious drivers will outnumber them. Let's hope so.

DON'T BLOW YOUR COOLANT

Although it's still early in the hot season, many of you have probably already had occasion to glance nervously at your temp gauge or "idiot light" as you passed a car with its hood up—radiator steaming.

If the sight of an overheated car bothered you a little bit, you had good reason to be concerned. More cars than ever are overheating. This is partly because today's low-compression, emission-controlled engines run much hotter. Newer cars also have hotter-rated thermostats, but smaller radiators and a decreased ability to dissipate heat.

But most cars overheat simply because their owners don't take a few minutes to do the very simple and inexpensive periodic maintenance their cooling system needs. If your car's cooling system is kept in good condition, it can easily handle the heat.

It's easy to understand the need for a cooling system when you realize that combustion temperatures inside your engine reach 4,500°F. With temperatures of lubricated parts exceeding 400°F, the engine would quickly destroy itself if some means were not employed to dissipate the heat.

Most cars circulate liquid (some engines are air-cooled) around the cylinders and heads to conduct heat away from the engine. The hot coolant is then pumped from the engine to the radiator, cooled by air from the fan and finally returned to the engine to repeat the job (Fig. 1).

THERMOSTAT

The thermostat, which controls coolant flow, is an important part of a cooling system. Located on the engine with the top radiator hose attached to it, the thermostat is simply a temperature-regulated valve (see picture). When the engine is cold, the thermostat closes off the radiator, trapping the coolant in the engine block. Since the coolant can't flow to the radiator to be cooled, the engine warms more quickly. When the engine reaches operating temperature, the thermostat opens and allows the coolant to circulate through the radiator and back to the engine to keep it from overheating. The thermostat occasionally becomes corroded and begins to operate sluggishly or stick. A thermostat sticking in the closed position is a frequent cause of overheating since the coolant can't circulate to do its job. However, the opposite extreme, a thermostat sticking in the open position, is nearly as bad. This causes what's known as "super-cooling," or an engine that never warms up. The result of this is excess sludge and gunk build-up that eventually leads to serious engine damage. For this reason you should never run an engine without a thermostat—even in a warm climate. Contrary to popular belief, a cool running engine isn't necessarily good. An engine that runs at its designed operating temperature is actually operating at best efficiency.

So you want to be sure your car's thermostat is operating properly to keep things cool but not too cool. There are a variety of ways to check a thermostat, but a quick general check is simply watching the car's temp gauge (or a thermometer inserted in the radiator) as the engine warms. The temperature should climb steadily until the engine reaches operating temperature or the temperature rating of the thermostat (somewhere between 160° and 200°F, check a manual), and then drop suddenly. The quick drop in temperature means the thermostat has opened and it is probably operating okay. If the temp fails to reach the normal operating temperature or fails to level off, the thermostat should be replaced.

This check will give you a general idea if the thermostat is sticking. But since a thermostat is an inexpensive part, your best bet is to replace it if you have any doubts about its operation. To replace the thermostat, simply remove the housing and install the new thermostat exactly as the old one came out.

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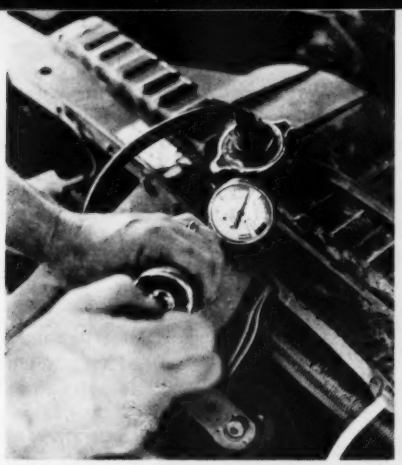
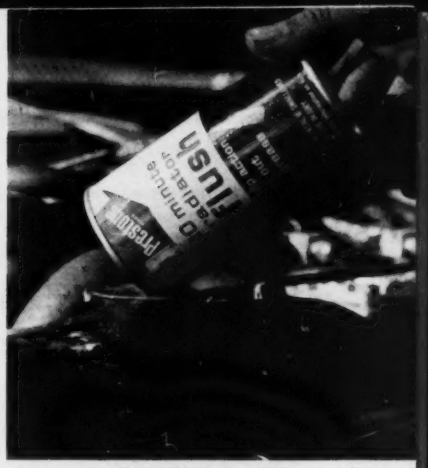
The thermostat is a temperature-regulated valve that controls coolant flow from the engine to the radiator. The valve occasionally sticks, causing overheating or "super-cooling" and should be replaced at any sign of trouble.

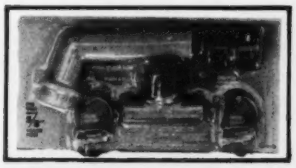


The most common type of pressure tester attaches to the radiator filler neck. Pump it until the dial indicates the pressure rating of the system. If the pressure reading drops, there is a leak in the system. Also use the tester to check the radiator cap for a leaking seal.



Radiator "Quick-Flush" products help to loosen accumulated rust and sludge before flushing the system.

THE BACKYARD MECHANIC



Using an inexpensive flushing kit is the safest, easiest, and most effective way to flush your cooling system at home.

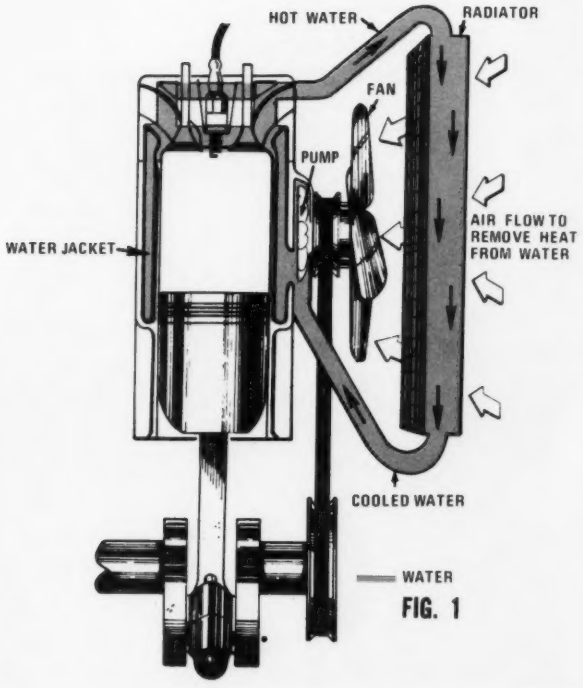
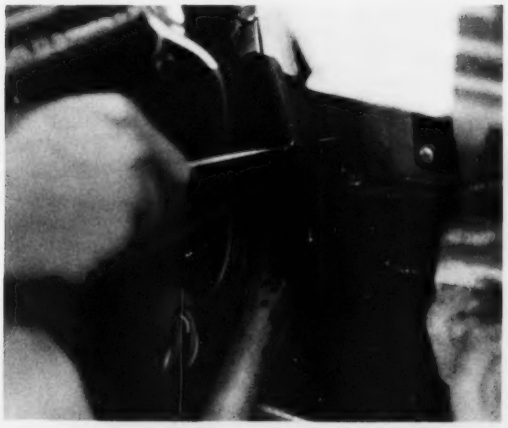
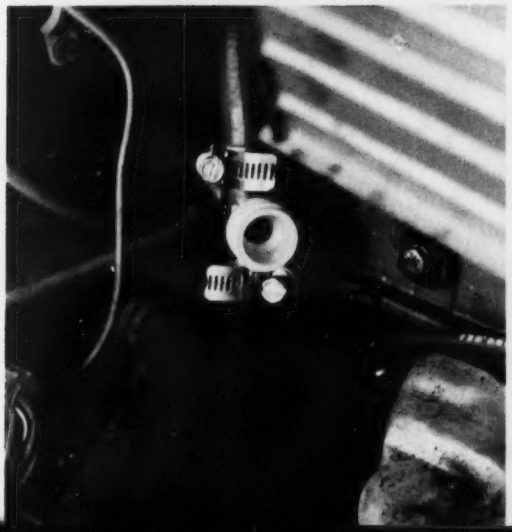
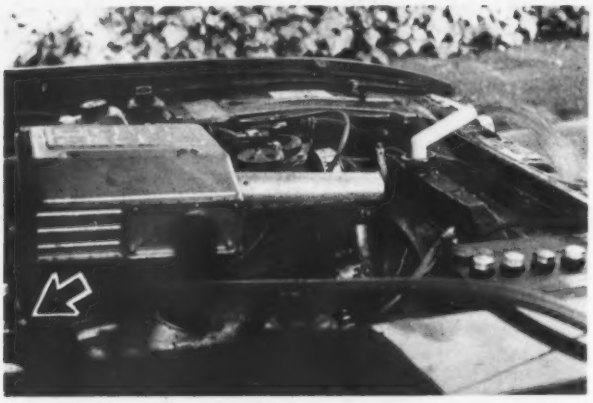


FIG. 1





Installing a kit to flush the cooling system requires only cutting a heater hose and installing a T-fitting.



Hook a water hose (garden type) to the T-fitting. Water is back-flushed through the system—when it splashes out of the radiator, colorless, the system is clean.

Be sure the new thermostat has the proper temperature rating for your engine, and that you install a new gasket with a liberal coating of gasket sealer to inhibit leaks.

PRESSURE ESSENTIAL

Proper pressure is also essential in a modern cooling system. Cooling systems are pressurized to allow the engine to run hotter without boiling the vital coolant. For instance, the boiling temperature of ethylene glycol antifreeze-coolant at sea level is around 220°F. Add 15 pounds of pressure, however, and the boiling level jumps to about 265°F.

Since the normal operating temperature of many engines is near 200°F, it is essential that your car's cooling system hold the proper pressure for the engine to keep its cool under strain.

This pressurization is why you should remove the radiator cap very carefully, only after bleeding off the pressure—especially when the engine is hot. What many of you may have painfully discovered is that when the engine is hot, the coolant may be hotter than its normal boiling temperature. It doesn't boil because it's under pressure, but when the radiator cap is removed quickly, the pressure drops and the boiling level falls well below the temperature of the coolant. The result: a dangerous geyser of super-hot liquid.

PRESSURE CHECK

Checking your car's cooling system for pressure leaks is an important part of maintaining the system. This should be done at least every two years, when the system is flushed and other main-

Inspect hoses, and replace as necessary. Hoses excessively mushy or brittle when squeezed are overdue for replacement. Lower radiator hose may look good; but, if the spring inside has lost tension, it will cause overheating problems.

Universal or flexible replacement hoses are less expensive, more widely available, and work as well as hoses designed for your car. Worm-type hose clamps are best.

tenance performed.* The pressure test can be performed before draining the coolant to test the hose condition, since most leaks occur at hoses or connections. But if you're planning to replace any hoses, do a pressure check as a final step to be sure the system is holding pressure.

You can purchase a pressure tester for around $20. But for no more frequently than you'll use it, you may want to head for the hobby shop or have a mechanic perform the pressure check.

There are two basic types of pressure testers, but the most common type simply attaches to the radiator filler neck after the cap is removed. Pump pressure into the system until the dial on the tester indicates the pressure rating for your car (the service manual lists this, but generally a system which holds a 15 psi is pressure tight). Wait about 10 minutes—if the pressure on the dial drops, you have a leak in the system.

A recent survey indicated more than half the cars on the road have cooling systems which aren't holding their rated pressures. Since many cars overheat for this reason, it might be advisable to pressure-check the ssytem more frequently, especially during extra hot weather, or when mountain driving is anticipated.

CAP IMPORTANT

To test the radiator cap, clean any foreign material from beneath the rubber sealing washer on the underside of the cap with a piece of stiff cardboard. Attach the cap to the tester and pump up the pressure until the dial indicates the pressure rating shown on the cap. If pressure bleeds off after 5 minutes, you need a new cap. Leaking radiator caps are one of the main causes of overheating, so always replace a faulty cap.

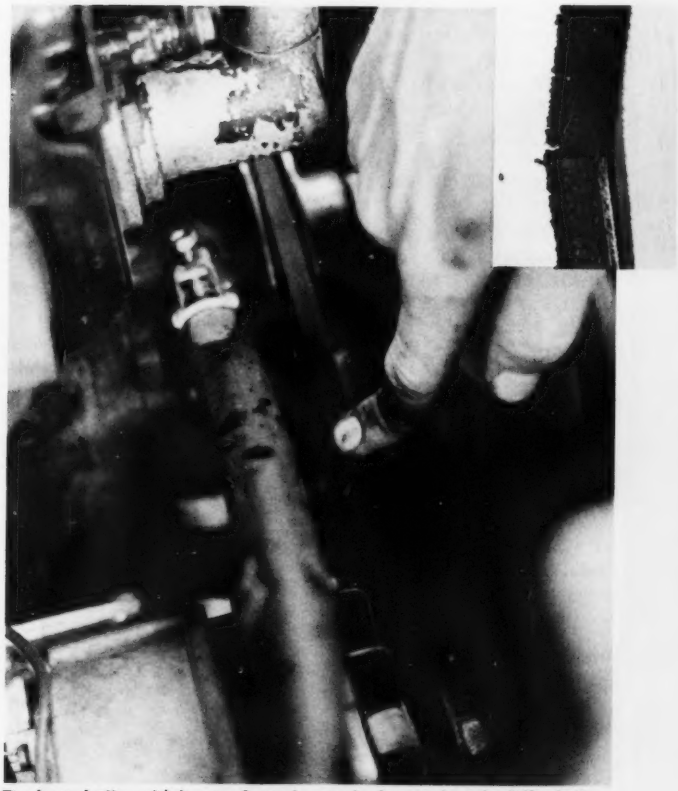
COOLANT WEARS OUT

Your car's cooling system operates (although at a lessened capacity) even if it has a pressure leak. But your car can't keep its cool without some type of liquid, or if rust and corrosion keep the coolant from circulating through the passages and radiator.

So draining, flushing, and replenishing the cooling system periodically is the most important cooling system maintenance. These steps are important because antifreeze-coolant deteriorates and eventually the rust inhibitors become exhausted. When this happens, corrosion and rust accumulate and clog the system. This clogging leads to overheating and eventually will lead you to a shop for a radiator back-flush.

However, the fairly expensive back-flush can be easily avoided by frequently draining and flushing the system to clean it of rust and crud. Most car manufacturers recommend this procedure every 2 years or 24,000 miles. But, since antifreeze-coolant is inexpensive, it may be well worth your time and money to perform this service yearly—especially if you notice a buildup of rust or sludge in the radiator.

continued



Replace belts which are frayed, cracked, or glazed. Adjust the belts so they have less than ½-inch of free play between the pulleys. A special gauge is recommended for exact tensioning.

Fill your cooling system with the proper mixture of antifreeze-coolant after flushing the system and inspecting hoses and belts. Plain water is not recommended for cooling system use at any time.

FLUSHING KIT

Draining and flushing the cooling system can be done by either of two methods. The usual method requires opening the drain plugs on a hot engine (some of which may be hard to get to) and trying to flush the radiator with a hose. The new "hassle-free" method requires purchasing a flushing kit for less than $2 and spending 5 minutes to install the kit and completely flush the system.

DRIVER strongly recommends using the flushing kit, which is the fastest and most efficient method of flushing your car's cooling system at home. Using a kit is also a safer method, since it eliminates the need for opening the engine block drain plugs, a possible source of a bad burn.

Because it is the most practical flushing method, we'll limit our discussion to the use of these kits. If you prefer to drain and flush the cooling system manually, however, remember that *you must open the engine drain plugs as well as the radiator drain cock to thoroughly purge the system.* It's also a good idea to get a can of radiator "quick-flush" and follow the instructions on the can before flushing the system by either method.

USING FLUSHING KIT

Flushing kits come with nearly everything needed to flush clean all but the most corroded system, and they include easy-to-follow instructions. To install the kit, first carefully release the pressure at the radiator cap. Then locate the heater hose that runs from the firewall to the engine block. There are two heater hoses; one runs to the water pump, but the one which goes to the block is the one you want.

Cut the heater hose in two near the firewall. Insert the T-fitting (provided in the kit) into the hose. Tighten the two hose segments to the "T" with the clamps provided (see pictures). Remove the radiator cap and insert the splash pipe into the radiator neck. Install a hose (garden type) at the T-fitting, and turn the water on full blast.

The water flowing in from the hose forces the coolant in the engine back through the system passages and up through the radiator, back-flushing the system. Simply let the water run until it splashes out of the radiator, colorless —then the system is clean.

HOSES

Check all radiator and heater hoses after flushing the system. Replace hoses every 2 to 3 years, or when they are worn, cracked, or even partially split. Also change any hose that feels mushy or extremely brittle when squeezed firmly. Be especially watchful for signs of splits when you squeeze the hoses; these splits have a habit of bursting wide open under pressure.

Don't overlook the small bypass hose located between the water pump and block on some engines. Also check the lower radiator hose very carefully. This hose contains a coiled-wire lining to keep it from collapsing during operation. If the wire loses tension, the hose can partially collapse at high speed and restrict coolant flow. This results in a very elusive overheating problem. For this reason, most mechanics replace this critical hose every 2 years, regardless of its apparent condition.

Replacement hoses designed for your car may be difficult to find, but the more popular universal or flexible type hoses will work just as well if they're of good quality. Be sure to remember that the lower radiator hose must be replaced with a hose containing a coiled support wire. Also keep in mind that

Installing an inexpensive coolant recovery system is one of the best ways to keep your car's cool. These devices are standard on some cars. They eliminate coolant loss as well as keeping your car running cooler.

installing one or two new hoses may increase pressure in the system, causing unreplaced hoses to leak unless they're in very good condition.

Before installing a new hose, clean off the connection with a wire brush and coat the surface with sealing compound. To make installing the hoses easier, place *new* clamps (don't reuse old spring-type clamps, even if they look good) on each end of the hose before positioning the hose. Slide the clamps to about ¼-inch from the end of the hose when it is properly positioned on the fitting. Tighten the clamp just short of cutting into the hose.

BELTS

Since drive belts are an essential part of your cooling system, replace those which show wear, are cracked, or are glazed on the inside surface. A loose or glazed fan belt is especially bad, since it may reduce air-flow and keep the water pump from delivering the required amount of coolant. The belt can also slip on the generator/alternator pulley and allow the battery to run down. A fan belt is one of those very inexpensive items which can cause a very expensive headache if it fails on the road. Don't hesitate to replace a worn belt, and carry a spare.

Adjust all belts with a tension gauge if you have one—exact tensioning is most important on a belt driving a lot of power equipment. If you don't have a gauge, adjust the belts until there is about ¼- to ½-inch play when the belt is pressed between the pulleys. Overtightening belts can cause serious damage, so be sure there is at least ¼-inch of play.

WATER NOT RECOMMENDED

With all the hoses securely clamped and the belts properly tensioned, tighten the draincock and replace any removed drain plugs. You are ready to refill the system with the proper mixture of good-quality antifreeze-coolant.

Plain water is no longer recommended for cooling system use, even in summer. Glycol-base coolant has many advantages over water; it dissipates heat more readily, has a higher boiling temperature, and has rust inhibitors, as well as water-pump lubricants.

FILLING THE SYSTEM

To fill a system which has been flushed with the flushing kit, disconnect the garden hose at the "T" and simply pour coolant into the radiator. The coolant will displace the water in the system, which will flow out at the "T." When you've added the correct amount of coolant (your manual gives the quart capacity of your cooling system, and the antifreeze container has a mixing chart on it), close the "T" with the cap provided. Since the "T" remains in place, all you have to do next time you want to flush your cooling system is to hook up a hose.

On a system which has drained through the drain openings, pour in the correct quantity of coolant (again, remember to close all drain openings) and fill the system the rest of the way with water. In either case, however, never exceed a ⅔ mixture of antifreeze to ⅓ water. While a 50-50 mixture is generally about normal, exceeding a 2 to 1 mixture actually decreases the heat dissipation and freeze-protection characteristics of the solution.

A final pressure check is a good idea, especially if you replaced any hoses. The check will assure you that all hoses are sealing correctly and that the system is pressure-tight. If your car's cooling system fails to hold proper pressure after replacing hoses and tightening clamps, check Chart A for other sources of pressure leakage. If your system maintains the correct pressure but still overheats, check Chart B for common causes of overheating.

JUST IN CASE

Timely cooling system maintenance should prevent the problem of a hot car, cracked engine block, hot temper, and expensive towing bill. But it's a good idea to have a few items in the trunk for emergencies.

You can never tell when a drive belt might snap, so don't take any chances with the critical fan belt. Always carry a spare belt and the tools to install it. Spare radiator hoses shouldn't be necessary if you change the hoses regularly. But a roll of tape and a few extra hose clamps can be useful for temporarily sealing small leaks or reinstalling a popped-off hose.

A gallon of water and a few rags to protect your hand when removing a steaming radiator cap are essential. The rags can also be stuffed into the filler neck to temporarily replace a blown radiator cap.

Finally, don't forget to have the radiator solution checked for freeze protection before the first north winds start blowing.

NOTE: Overheating is one of the major causes of road breakdowns—but one of the easiest to prevent. For this reason, plus the fact that the overheating season is here again, we felt that reprinting this cooling system article from our June '73 DRIVER was appropriate. Next month we'll continue our coverage of new topics in the "Backyard Mechanic."

CHART A

- Check the radiator's lockring to be sure it isn't pulled up or distorted. The radiator cap should seal easily and tightly on the ring.
- Check for leaks at the thermostat housing gasket.
- Check for leaks at the water pump. The gasket or the pump itself could be leaking.
- Check for leaks at the radiator seams. If a can of radiator sealant does not stop the leak, you should take the car to a reputable radiator shop for repair.
- A head gasket could be leaking. Drop some oil from the dipstick onto a hot engine part, such as the exhaust manifold; if it sizzles, water has leaked into the oil. Have the engine checked by a good mechanic.

CHART B

- Check for obstructed airflow through the radiator. A high-pressure spray from a hose is usually sufficient to remove an accumulation of bugs or other obstructions from the radiator.
- Check the coolant level with the engine at operating temperature (be sure to release the pressure and protect your hand when removing the cap). Bring the level up to the bottom ring on the filler neck with the engine idling.
- Check the antifreeze mixture to be sure it is at the recommended strength.
- Check ignition timing and brakes. Retarded timing or dragging brakes cause an engine to run hot.
- Check the fan drive and its clutch. This is a special device designed to turn the fan at an increased speed when the engine gets hot. Your manual shows how to check this device if your car has one.
- Check the thermostat operation. A thermostat sticking shut will cause a car to overheat, since the coolant can't circulate to the radiator. Manuals show several other methods for checking the thermostat. Be sure to install a new gasket if you remove the thermostat for inspection.

BACKFIRE

LETTERS TO THE EDITOR

WHEEL CYLINDERS

In reading "Backyard Mechanic" in the March issue, I ran across a few statements on building wheel cylinders that I feel could be dangerous. Since my civilian occupation is that of an auto mechanic, I am very much concerned with the proper and safe way to service a brake system.

The statement that caught my attention was, "If the wheel cylinder is not leaking . . ." and also "Check the cylinders for leaks by pulling back on the rubber cap." These statements hint rather strongly that if a cylinder is not leaking it need not be rebuilt. This is where we part ways! My experience has been that when new brake linings are installed and the adjusters have been screwed down to compensate for the new thickness, the pistons in the cylinders are sometimes repositioned inside the cylinders. If the cylinders are clean, this usually causes no problem. However, if there are some pitted areas, and the sealing edge of the cup is repositioned over the pit, a leak can occur.

I speak from experience, having almost lost a good customer and friend several days after replacing linings only. The cylinders looked perfect! The fluid slowly leaked out and he finally lost all brakes when slowing for a red light at a busy intersection. Luckily, he managed to swerve and miss all traffic . . .

TSgt Ronald K. Harter
California Air National Guard
Fresno, CA 93727

You're absolutely right. It's best not to take any chances; rebuild or replace wheel cylinders when new linings are installed.

BLOWIN' IN THE WIND

I happened to see one of your magazines being blown by a 55-mph wind and was able to pick it up. The December issue. It so happens that I am past the age of 75 and agree with all that I have read in this one . . .

I've been driving accident-free all my life, although in 1932 I was hit by a drunk while stopped. Figure I drive like

David Peterson even at age 75! Keep up the education—even at my age we need it.

Carl F. Seydell

Wichita, Kansas

HANDY HINTS

With regard to your comments about engine washing (March issue), I have found that the best way to dry the ignition system is to use a regular home vacuum cleaner. Simply place the vacuum cleaner hose in the exhaust port of the vacuum cleaner and let it run for about a minute to insure that household dust is blown out of the hose. By this time the exhaust of the vacuum cleaner is good, clean, warm air. Remove the distributor cap and direct the hose into the distributor. Water will be blown from the distributor and all of its parts, points, wires, etc. Next direct the hose into the distributor cap to dry it out. This same procedure can be used to dry ignition wires to the coil and spark plugs. (It works every time.)

I also recommend the procedure for removing water from the alternator after washing the engine.

Major William R. Cage, Jr.
197th Infantry Brigade
Fort Benning, Georgia 31905

SHE LIKES US

I enjoyed reading your article on motorcycling in the March issue, "Getting Into It," and am looking forward to future articles in the series.

Your article was very informative, especially to us women who enjoy riding motorcycles but are not as mechanically inclined as our male counterparts. It answered many of my questions relating to all phases of motorcycling. Thanks for making all your articles entertaining as well as educational.

Seaman Stephanie G. Harman
Navy Recruiting Station
El Paso, TX 79901

THE ARMY'S IN

We recently received the March 1974 issue of DRIVER. No such publication is available through the Army. The scope of information presented would make an excellent addition to the material now being presented in the 75th Field Artillery Group's Safety Program.

Cpt Alan R. Thiele
Safety Officer
Fort Sill, OK 73503

Army now purchases DRIVER in quantity and you should be able to get on distribution by going through your regular channels. The same is true for Navy, Marine Corps and Coast Guard. Every service now distributes this magazine, a fact of which we are very proud.

STOP, THIEF!

Warning! Some of the new, spring-type antitheft devices for gas tanks are unsafe. Some of these devices are made of very poor grade metals that will corrode. There also are some on the market that are painted. The paint will come off and the results are often a carburetor overhaul. Rust and paint are very bad news coming from these cheap springs. Make sure you buy only top quality antitheft springs and have a competent mechanic install them. An improperly installed spring can get into the tank and cause serious damage to the sensitive fuel-sending unit which works the gas gauge.

Sgt Jerry Lee Newberry
354th Supply Squadron
Myrtle Beach, AFB, SC 29577

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TUNEUP

CAPTION CONTEST

How's your sense of humor? Write a caption for this ⇨ cartoon. We'll print the funniest one.

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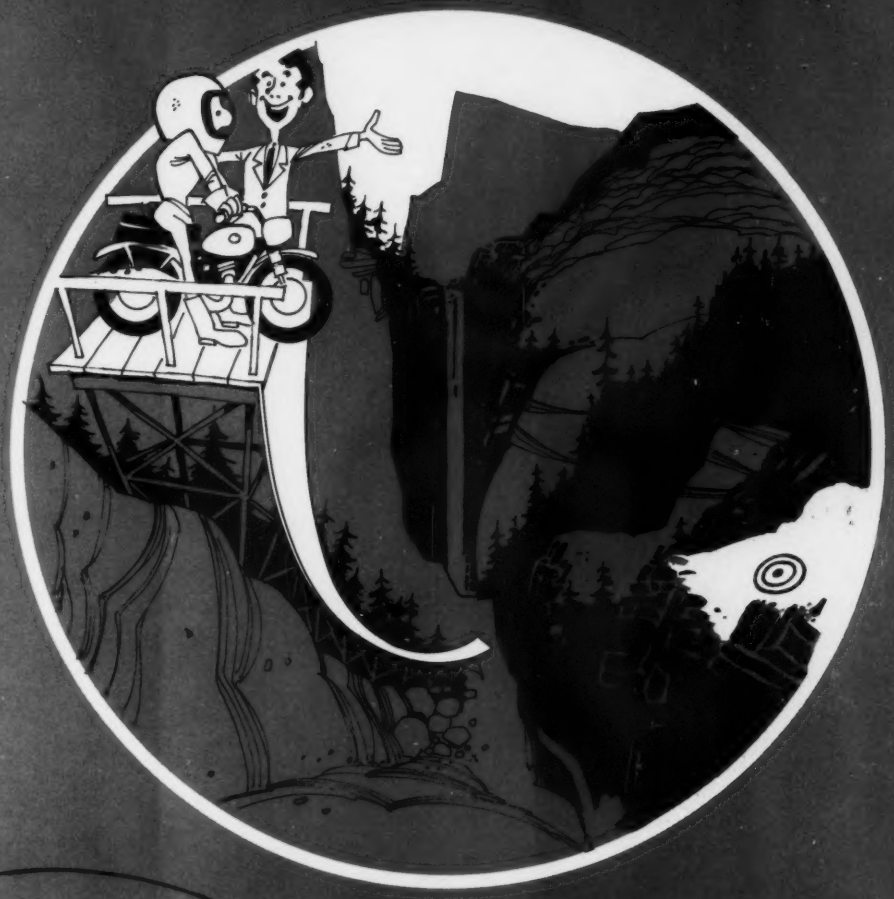

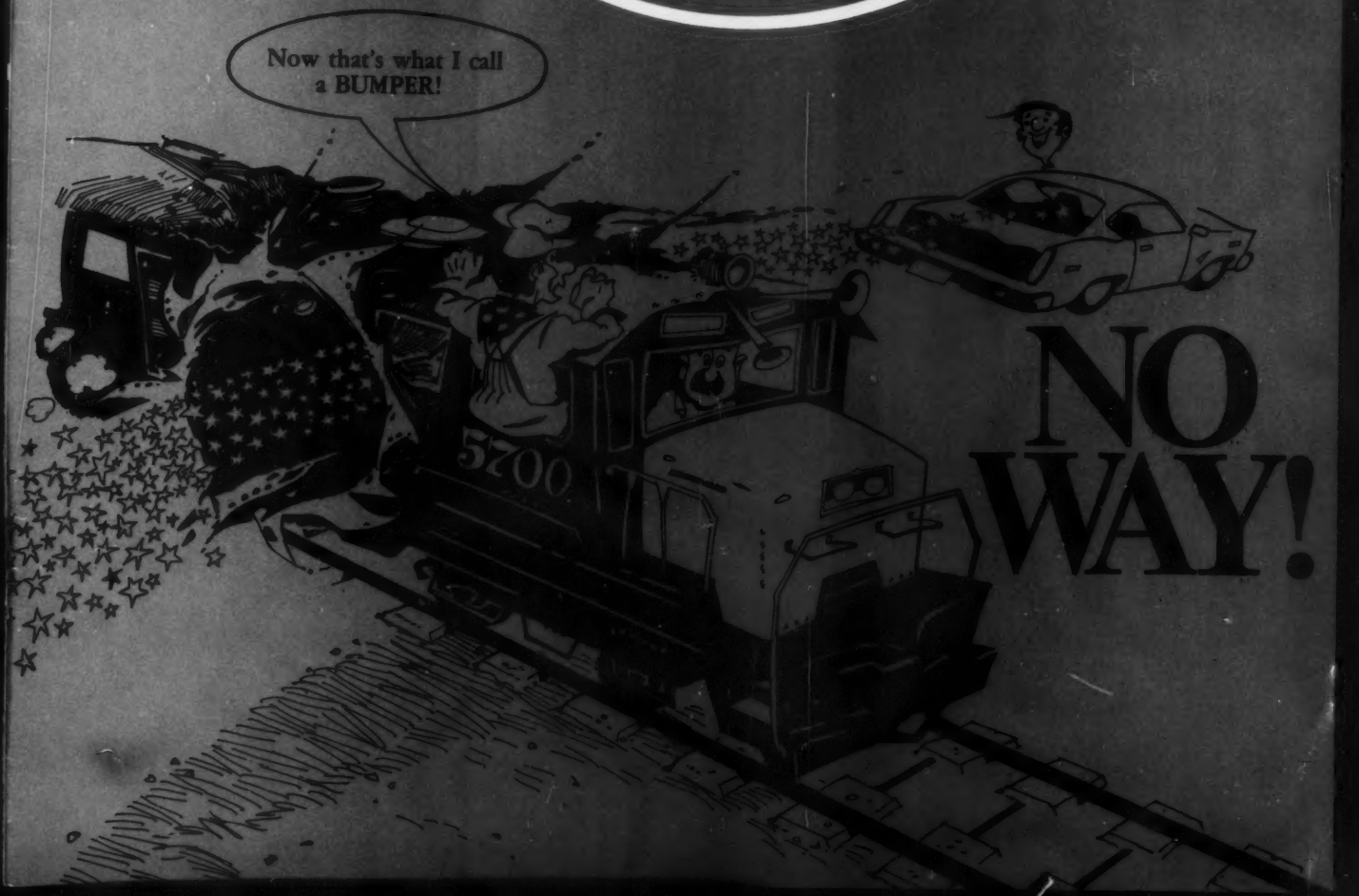

Miss DRIVER

"This question is for all you DRIVER readers who use campers: Do you have an audible or visual signalling device to allow a camper occupant to gain the attention of the vehicle's driver? Many lives lost because of fire, smoke, and carbon monoxide poisoning could have been saved by an inexpensive buzzer or flashing light with which the camper occupant could signal the driver. Some states have passed laws requiring such devices. Even if your state has not, take a tip from me and install one before that next weekend trip comes up.

LOIS E. JONES